CLAIMS LISTING

The current listing of claims, as amended hereby, supercedes all previous listing of claims.

1. (Presently Amended) An image processing method for extracting a threadlike structure (GW) represented in an image, comprising steps of:

(a) executing a phase of acquisition of a sequence of images, including an image of a present instant ~~(t)~~ in which the threadlike structure is to be extracted and an image of a past instant ~~(t-1)~~ in which the threadlike structure is detected as a string of points ~~(G_{t-1})~~,

(b) executing a phase of prediction of a silhouette ~~($\hat{G}_t$)~~ of the threadlike structure estimated from said detected string of points ~~(G_{t-1})~~ of the image of the past instant,

(c) executing a phase of pursuit for extracting a final string of points ~~(G_t)~~ representing the threadlike structure in the image of the present instant t, including estimating a constraint ~~CZ_t~~, defined as a search zone, and ~~θ~~, defined as the direction of said silhouette ~~($\hat{G}_t$)~~, said constraints utilized for performing said extraction,

wherein in step (c), the estimation of constraints requires estimation of the search zone in the image of the present instant around the silhouette for constrained extraction of the final string of points in said search zone, and includes the estimation of an interval of directions associated to the points of the search zone, and wherein a neighborhood is estimated for each given point of the search zone so that the neighborhood intersects the silhouette and determines a segment and wherein the directions of the silhouette are determined at each point of the segment, forming a set of directions, which set of directions determines the interval of directions for a constrained extraction of the final string of the points that are associated to an interval of directions.

2. (Presently Amended) The method of Claim 1, wherein in ~~the prediction phase~~step (b), the silhouette ~~($\hat{G}_t$)~~ is formed of the string of points ~~(G_{t-1})~~ detected in the image of the past instant ~~(t-1)~~.

3. (Presently Amended) The method of Claim 1, wherein ~~:~~

~~the step of executing the acquisition phase comprises~~step (a) includes a first image of a first past instant ~~(t-2)~~ and a second subsequent image of a second past instant ~~(t-1)~~, in which the threadlike structure is detected as respective first and second strings of points ~~(G_{t-2}, Gt_{-1})~~, and

~~the step of executing the prediction phase comprises~~step (b) includes a calculation of a translation value and a speed of translation between the first and second strings of points ~~(G_{t-2}, G_{t-1})~~, wherein the calculation of the translation value occurs between the second past instant ~~(t-1)~~ and the present instant ~~(t)~~, and wherein the translation value is utilized for estimating the location of the silhouette ~~($\hat{G}_t$)~~ in the image of the present instant ~~(t)~~.

4. (Canceled)

5. (Presently Amended) The method of Claim 41, wherein the search zone~~SearchZone (CZ_t)~~ is a ~~Canal-Shaped Zone~~canal shaped zone, and may be referred to interchangeably as ~~Canal Zone~~ canal zone ~~(CZ_t)~~ or search zone ~~Search Zone (CZ_t)~~, and is centered on said silhouette ~~($\hat{G}_t$)~~.

6. (Canceled)

7. (Canceled)

8. (Presently Amended) The method of Claim ~~7~~1, wherein the search zone ~~Search Zone (CZ_t)~~ is a canal shaped zone ~~canal Shaped zone~~ which may be referred to interchangeably as search zone ~~Search Zone (CZ_t)~~ or canal zone ~~Canal Zone (CZ_t)~~, and is estimated by an operation of mathematical morphological dilation using discs or spheres ~~(D_t)~~ of a predetermined radius ~~(R_t)~~ around the silhouette ~~($\hat{G}_t$)~~, including extracting a string of points in said canal zone ~~Canal Zone (CZ_t)~~ by ridgeness estimation along the directions

of the interval of direction associated to each point and the final string of points ~~(G_t)~~ is selected from the points having the highest ridgeness.

9. (Presently Amended) The method of claim 1, ~~further comprising that the step of executing the pursuit phase~~wherein step (c) includes evaluating a tip of the extracted string of points to determine whether the tip of the extracted string of points is correctly located for representing the threadlike structure in the image of the present instant.

10. (Presently Amended) The method of Claim 9, ~~further comprising the step of executing the pursuit phase~~ wherein step (c) includes correlating a shape for estimating the correct location of a final tip for the final string of points ~~(G_t)~~ representing the threadlike structure.

11. (Presently Amended) The method of claim 1, wherein a loop of execution is carried out between ~~the step of pursuit phase execution~~step (c) and ~~the step of prediction phase execution~~step (b) for improving the detection of the silhouette ~~($\hat{G}_t$)~~ and the extraction of the string of points ~~(G_t)~~ for representing the threadlike structure ~~(GW)~~ in the image of the present instant ~~(t)~~.

12. (Previously Presented) A system comprising a suitably programmed computer or a special purpose processor having circuit means, which circuit means is arranged to process image data according to the method as claimed in claim 1.

13. (Presently Amended) A medical examination imaging apparatus having circuit means for acquiring medical digital image data, and having a system which has access to ~~said~~ the medical digital image data according to Claim 12, the medical examination imaging apparatus further including display means for displaying the medical digital images and the processed medical digital images.

14. (Previously Presented) A computer program embodied in a computer readable medium comprising a set of instructions for carrying out a method as claimed in claim 1.

15. (New) A method comprising steps of:

(a) acquiring a sequence of images, including at least one present image from which a threadlike structure is to be extracted and at least one past image in which the threadlike structure is detectable as a string of points,

(b) predicting a silhouette of the threadlike structure estimated from the detectable string of points,

(c) extracting a final string of points representing the threadlike structure in the present image, including (i) estimating a search zone in the present image around the silhouette, (ii) estimating a direction for the silhouette, (iii) estimating an interval of directions associated with search zone points, wherein a neighborhood is estimated for each search zone point so that the neighborhood intersects the silhouette, and wherein the direction for the silhouette is determined at each point of silhouette intersection so as to define a set of directions usable to determine the interval of directions for extracting the final string of points that are associated therewith.

16. (New) The method of Claim 15, wherein step (a) includes a first past image and a second, subsequent past image, in which the threadlike structure is detected as respective first and second strings of points.

17. (New) The method of Claim 16, wherein step (b) includes a calculation of a translation value and a speed of translation between the first and second strings of points, wherein the calculation of the translation value occurs between the second past image and the present image, and wherein the translation value is utilized for estimating the location of the silhouette in the present image.

18. (New) The method of Claim 15, wherein the search zone is estimated by an operation of mathematical morphological dilation using discs or spheres of a predetermined radius around the silhouette.

19. (New) The method of claim 15, wherein a loop of execution is carried out between step (c) and step (b) for improving the detection of the silhouette and the extraction of the final string of points for representing the threadlike structure in the present image.

20. (New) A system comprising a suitably programmed computer or a special purpose processor having circuit means, which circuit means is arranged to process image data according to the method as claimed in claim 15.

21. (New) A medical examination imaging apparatus having circuit means for acquiring medical digital image data, and having a system which has access to the medical digital image data according to Claim 20, the medical examination imaging apparatus further including display means for displaying the medical digital images and the processed medical digital images.

22. (New) A computer program embodied in a computer readable medium comprising a set of instructions for carrying out a method as claimed in claim 15.